

REMARKS

The Office Action dated November 21, 2005, has been received and carefully considered. In this response, paragraphs [0014] and [0040] of the specification and claims 1-14, 17 and 20-25 have been amended, and new claims 26-29 have been added. Entry of the amendments to paragraphs [0014] and [0040] of the specification and claims 1-14, 17 and 20-25, and the addition of claims 26-29 is respectfully requested. Reconsideration of the outstanding objections/rejections in the present application is also respectfully requested based on the following remarks.

I. THE OBJECTION TO THE SPECIFICATION

On page 2 of the Office Action, paragraphs [0014] and [0040] of the specification were objected to for grammatical or spelling errors. Responsive to this objection, paragraphs [0014] and [0040] have been amended to remove the informalities.

In view of the foregoing, it is respectfully requested that the aforementioned objection to the specification be withdrawn.

II. DOUBLE PATENTING

On page 3 of the Office Action, claims 1 and 21 were provisionally rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over

claims 26, 54, 55 and 66 of Applicants' co-pending U.S. Patent Application No. 10/778,436. Applicants believe that the Examiner actually meant to reject claims 1 and 14 on this ground. Applicants respectfully submit that claims 1 and 14 have now been amended, and the double patenting rejection has become moot.

In view of the foregoing, it is respectfully requested that the aforementioned double patenting rejection of claims 1 and 21 be withdrawn.

III. THE INDEFINITENESS REJECTION OF CLAIM 10

On page 4 of the Office Action, claims 10 was rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the invention. Although Applicants do not agree with the Examiner's assertion that the phrase "removing the data" is unclear, claim 10 has been amended by replacing the word "removing" with "overwriting."

In view of the foregoing, it is respectfully requested that the aforementioned indefiniteness rejection of claim 10 be withdrawn.

IV. NON-STATUTORY SUBJECT MATTER IN CLAIMS 23-25

On page 5 of the Office Action, claims 23-25 were rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter. Claims 23-25 have been amended and are now directed to a computer readable medium.

In view of the foregoing, it is respectfully requested that the aforementioned non-statutory subject matter rejection of claims 23-25 be withdrawn.

V. THE ANTICIPATION REJECTION OF CLAIMS 1-10, 13-15, 18, 19 AND 21-25

On page 5 of the Office Action, claims 1-10, 13-15, 18, 19 and 21-25 were rejected under 35 U.S.C. § 102(e) as being anticipated by Green et al. (U.S. Patent Application Pub. No. 2003/0167380, hereinafter "Green"). It is believed that this rejection has become moot in view of the amendments to claims 1-14, 17 and 20-25.

For example, Green does not disclose the following elements in the amended claim 1.

- *"wherein the storage management system automatically intercepts write commands issued to the plurality of units of storage, each write command comprising an instruction to overwrite at least one unit of storage with new data";*

- *"wherein the storage management system copies, prior to execution of each write command, old data present at the at least one unit of storage into the at least one data store, wherein a record of the old data is timestamped."*

Claims 2-13 are dependent upon independent claim 1. Thus, since independent claim 1 should be allowable as discussed above, claims 2-13 should also be allowable at least by virtue of their dependency on independent claim 1. Moreover, these claims recite additional features which are not claimed, disclosed, or even suggested by the cited references taken either alone or in combination.

Regarding claim 14, Green does not disclose *"intercepting, automatically, write commands issued to the storage system, wherein each write command comprises an instruction to overwrite at least one unit of storage with new data" or "copying, prior to execution of the write command, old data present at the at least one unit of storage into a data store, wherein a record of the old data is timestamped."* Therefore, claim 14 and its dependent claims 15-20 should be patentable over Green.

Regarding claim 21, Green does not disclose *"wherein the storage appliance comprises at least one current store and at least one time store, the at least one current store maintaining*

a current mirror copy of digital content in the one or more physical storage devices, and wherein, each time immediately before a storage unit is overwritten with new data, any old data present at that storage unit is timestamped and stored in the at least one time store." Therefore, claim 21 and its dependent claim 22 should be patentable over Green.

Regarding claim 23, Green does not disclose *"code adapted to automatically intercept write commands issued to the storage system, wherein each write command comprises an instruction to overwrite at least one unit of storage with new data" or "code adapted to copy, prior to execution of the write command, old data present at the at least one unit of storage into a data store, wherein a record of the old data is timestamped."* Therefore, claim 23 and its dependent claims 24-25 should be patentable over Green.

In view of the foregoing, it is respectfully requested that the aforementioned anticipation rejection of claims 1-10, 13-15, 18, 19 and 21-25 be withdrawn.

VI. THE OBVIOUSNESS REJECTION OF CLAIMS 11, 12 AND 16-20

On page 9 of the Office Action, claims 11, 12 and 16-20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Green in view of "UNIX In A Nutshell" by Daniel Gilly and

the staff of O'Reilly & Associates, Inc. (hereinafter "Gilly"). In view of the amendments to claims 1-14, 17 and 20-25, Applicants believe that this rejection has become moot. Since Gilly does not disclose any of the above-listed claim features that Green fails to disclose, the combination of Green and Gilly cannot render any of the pending claims obvious.

In view of the foregoing, it is respectfully requested that the aforementioned obviousness rejection of claims 11, 12 and 16-20 be withdrawn.

VII. CONCLUSION

In view of the foregoing, it is respectfully submitted that the present application is in condition for allowance, and an early indication of the same is courteously solicited. The Examiner is respectfully requested to contact the undersigned by telephone at the below listed telephone number, in order to expedite resolution of any issues and to expedite passage of the present application to issue, if any comments, questions, or suggestions arise in connection with the present application.

A petition for one-month extension of time under 37 CFR § 1.136 is hereby made.

Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to

Patent Application
Client Reference No.: RVI-001
Attorney Docket No.: 66281.000002

Deposit Account No. 50-0206, and please credit any excess fees
to the same deposit account.

Respectfully submitted,

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Date: March 21, 2006

Appendix A

In paragraph [0014]:

[0014] In one aspect, the invention relates to a method of accessing data stored on a storage device that is particularly suited to instantly restoring a storage device (e.g., a disk drive, a logical unit, a virtual unit, etc.) to ~~as-past-time~~ a past time. An address and a time are specified to access the data stored on the storage device at the address at or before the time. This is particularly useful to users who are performing forensic analysis of the storage device. In one embodiment, the address includes a device identifier and a location identifier. It is particularly useful to present a virtual storage device for which the time is implicitly set to the specified time for all addresses of the virtual storage device because it allows generation of the virtual storage device substantially instantaneously. In one embodiment, data is written to the virtual storage device.

In paragraph [0040]:

[0040] In one embodiment, the I/O manager includes a current store controller, a time store controller, and functional storage. The I/O manager can implement optimization routines by tracking idempotent groups of control packets. The I/O manager can ~~maintains~~ maintain a number of control information tables.



Appendix B

(Currently Amended) A storage management system for backing up digital content of a storage system comprising a plurality of units of storage, wherein the storage management system comprises:

at least one data store;

wherein the storage management system automatically intercepts write commands issued to the plurality of units of storage, each write command comprising an instruction to overwrite at least one unit of storage with new data; and

wherein the storage management system copies, prior to execution of each write command, old data present at the at least one unit of storage into the at least one data store, wherein a record of the old data is timestamped.

~~each unit of storage storing digital data, each unit of storage accessed by specifying an address and a time.~~

2. (Currently Amended) The storage management system of claim 1, wherein the storage system further comprises ~~comprising~~ one or more physical storage devices on which the digital content of the storage system is ~~data are~~ stored.

3. (Currently Amended) The storage management system of claim 2, wherein ~~the~~ an address for accessing the storage system comprises a device identifier and a location identifier.

4. (Currently Amended) The storage management system of claim 3, wherein the device identifier identifies a physical storage device.

5. (Currently Amended) The storage management system of claim 3, wherein the device identifier identifies a logical device.

6. (Currently Amended) The storage management system of claim 1, wherein the digital content of the storage system can be accessed by specifying an address and a time, and wherein the time specifies that the digital data retrieved from the address is the most recent digital data that was written to the address at or before the time.

7. (Currently Amended) The storage management system of claim 6 ~~1~~, wherein the time is explicitly specified in a request to access a unit of storage.

8. (Currently Amended) The storage management system of claim 6 ~~1~~, wherein the time is specified in a command to the storage system separate from a request to read a unit of storage.

9. (Currently Amended) The storage management system of claim 6 ~~1~~, wherein the storage management system creates a virtual device, wherein the time is specified when the virtual device is created, and is applied when the virtual device is accessed.

10. (Currently Amended) The storage management system of claim 9, wherein new data is written to the virtual device without ~~removing~~ overwriting the data that was written to the storage system after the time specified when the virtual device was created.

11. (Currently Amended) The storage management system of claim 6 ~~1~~, wherein a command to the storage system specifies that the

time is implicitly ~~the~~ a current time.

12. (Currently Amended) The storage management system of claim 6
1, wherein the time is specified relative to ~~the~~ a current time.

13. (Currently Amended) The storage management system of claim
1, wherein the units of storage are blocks.

14. (Currently Amended) ~~A method of accessing data stored on a
storage device, the method comprising: specifying an address and
a time to access the most recent data stored on the storage
device at the address at or before the time.~~

A method for backing up digital content of a storage system
having a plurality of units of storage, the method comprising:

intercepting, automatically, write commands issued to the
storage system, wherein each write command comprises an
instruction to overwrite at least one unit of storage with new
data; and

copying, prior to execution of the write command, old data
present at the at least one unit of storage into a data store,
wherein a record of the old data is timestamped;

whereby digital content of the storage system can be
accessed by specifying an address and a time to access the most
recent data stored on the storage device at the address at or
before the time.

15. (Original) The method of claim 14, wherein the address
comprises a device identifier and a location identifier.

16. (Original) The method of claim 14, wherein specifying the
time comprises implicitly specifying the time.

17. (Currently Amended) The method of claim 16, wherein implicitly specifying the time comprises sending a command to the storage system to use ~~the~~ a current time as the time.

18. (Original) The method of claim 14, further comprising presenting a virtual storage device for which the time is implicitly set to the specified time for all addresses of the virtual storage device.

19. (Original) The method of claim 18, further comprising writing data to the virtual storage device.

20. (Currently Amended) The method of claim 14, wherein specifying the time comprises specifying the time relative to ~~the~~ a current time.

21. (Currently Amended) Apparatus for storing data, the apparatus comprising:

a storage appliance that interfaces with a computer;
one or more physical storage devices that interface with the storage appliance, the one or more physical storage devices having a plurality of storage units, each such physical storage device controlled by the storage appliance;

wherein the storage appliance comprises at least one current store and at least one time store, the at least one current store maintaining a current mirror copy of digital content in the one or more physical storage devices, and wherein, each time immediately before a storage unit is overwritten with new data, any old data present at that storage unit is timestamped and stored in the at least one time store;

wherein the storage appliance presents one or more virtual storage devices to the computer based on the at least one current store and the at least one time store, and wherein digital data on each of the virtual storage devices is accessed by specifying an address and a time.

22. (Currently Amended) The apparatus of claim 21, wherein the time specifies that the digital data retrieved from the address is the most recent ~~digital~~ data that was written to the address at or before the time.

23. (Currently Amended) ~~A data packet corresponding to a storage device command, the data packet comprising:~~

A computer readable medium having code for causing a processor to control a storage system, the storage system comprising a plurality of units of storage, the computer readable medium comprising:

code adapted to automatically intercept write commands issued to the storage system, wherein each write command comprises an instruction to overwrite at least one unit of storage with new data; and

code adapted to copy, prior to execution of the write command, old data present at the at least one unit of storage into a data store, wherein a record of the old data is timestamped;

wherein digital content of the storage system is accessible with a storage device command, the storage device command comprising a storage device address identifying the location of one or more units of storage, and a time specification specifying data most recently stored at the storage device address at or before a specified time.

24. (Currently Amended) The computer readable medium ~~data packet~~ of claim 23, wherein the storage device command is a write command and the point in time is ~~the present~~ a current time.

25. (Currently Amended) The computer readable medium ~~data packet~~ of claim 23, wherein the storage device command is a read command and the point in time is ~~the~~ a past time.

26. (New) The storage management system of claim 1, wherein the at least one data store comprises a first data store and a second data store, and wherein the first data store maintains a current mirror copy of digital data stored in the plurality of units of storage, and wherein the second data store contains the old data and the timestamped record of the old data.

27. (New) The storage management system of claim 26, wherein, after the old data is copied to the second data store, the at least one unit of storage is overwritten with the new data, and the current mirror copy in the first data store is updated with the new data.

28. (New) The method of claim 14, further comprising:
 maintaining, in a second data store, a current mirror copy of the digital content of the storage system; and
 overwriting the at least one unit of storage with the new data and updating the current mirror copy in the second data store with the new data, wherein the overwriting and the updating occur after the old data is copied to the data store.

29. (New) The computer readable medium of claim 23, further

comprising:

code adapted to maintain, in a second data store, a current mirror copy of the digital content of the storage system; and

code adapted to overwrite the at least one unit of storage with the new data and update the current mirror copy in the second data store with the new data after the old data is copied to the data store.